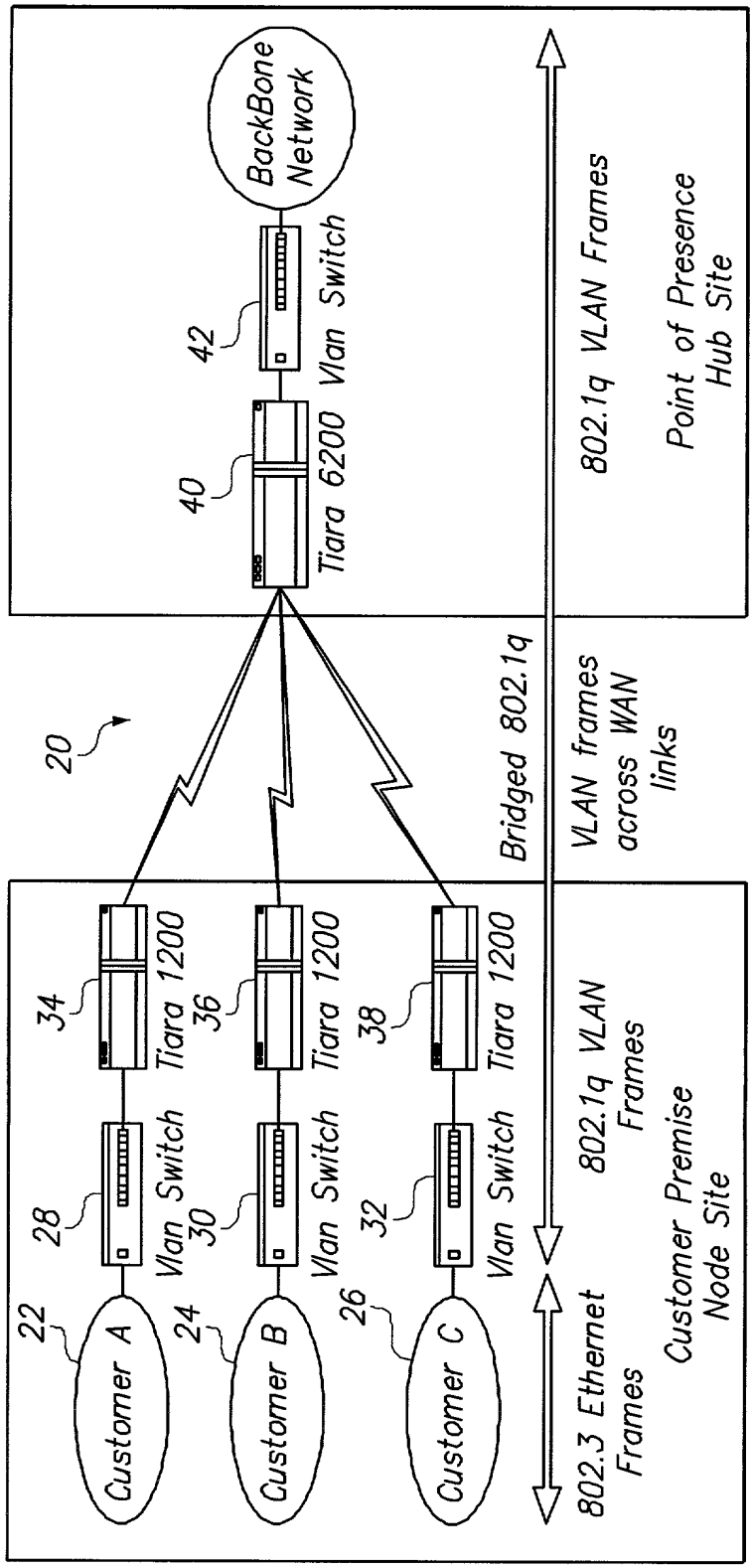

BackBone Network
42
40
Tiara 6200 Vlan Switch
802.1q VLAN Frames
Point of Presence Hub Site
20
Bridged 802.1q
VLAN frames across WAN links
34
36
38
Tiara 1200
Tiara 1200
Tiara 1200
28
30
32
Vlan Switch
Vlan Switch
Vlan Switch
802.1q VLAN Frames
22
24
26
Customer A
Customer B
Customer C
802.3 Ethernet Frames
Customer Premise Node Site

FIG. 1A

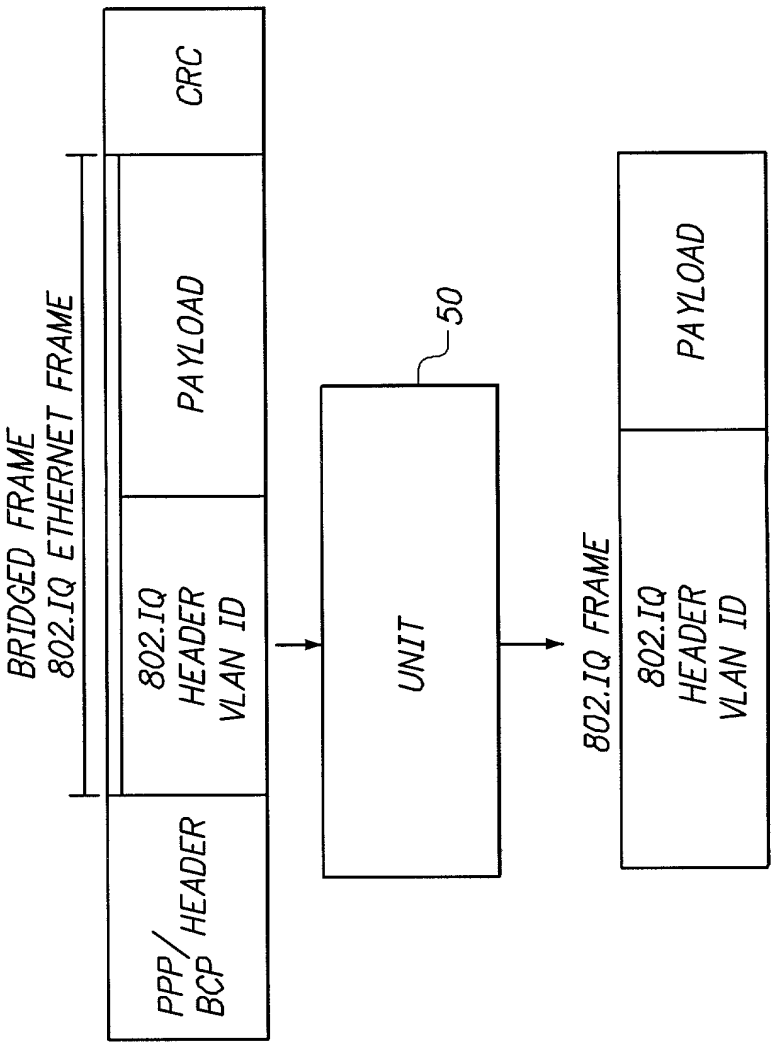

BRIDGED FRAME
802.IQ ETHERNET FRAME
PPP/BCP HEADER
802.IQ HEADER VLAN ID
PAYLOAD
CRC
50
UNIT
802.IQ FRAME
802.IQ HEADER VLAN ID
PAYLOAD

FIG. 1B

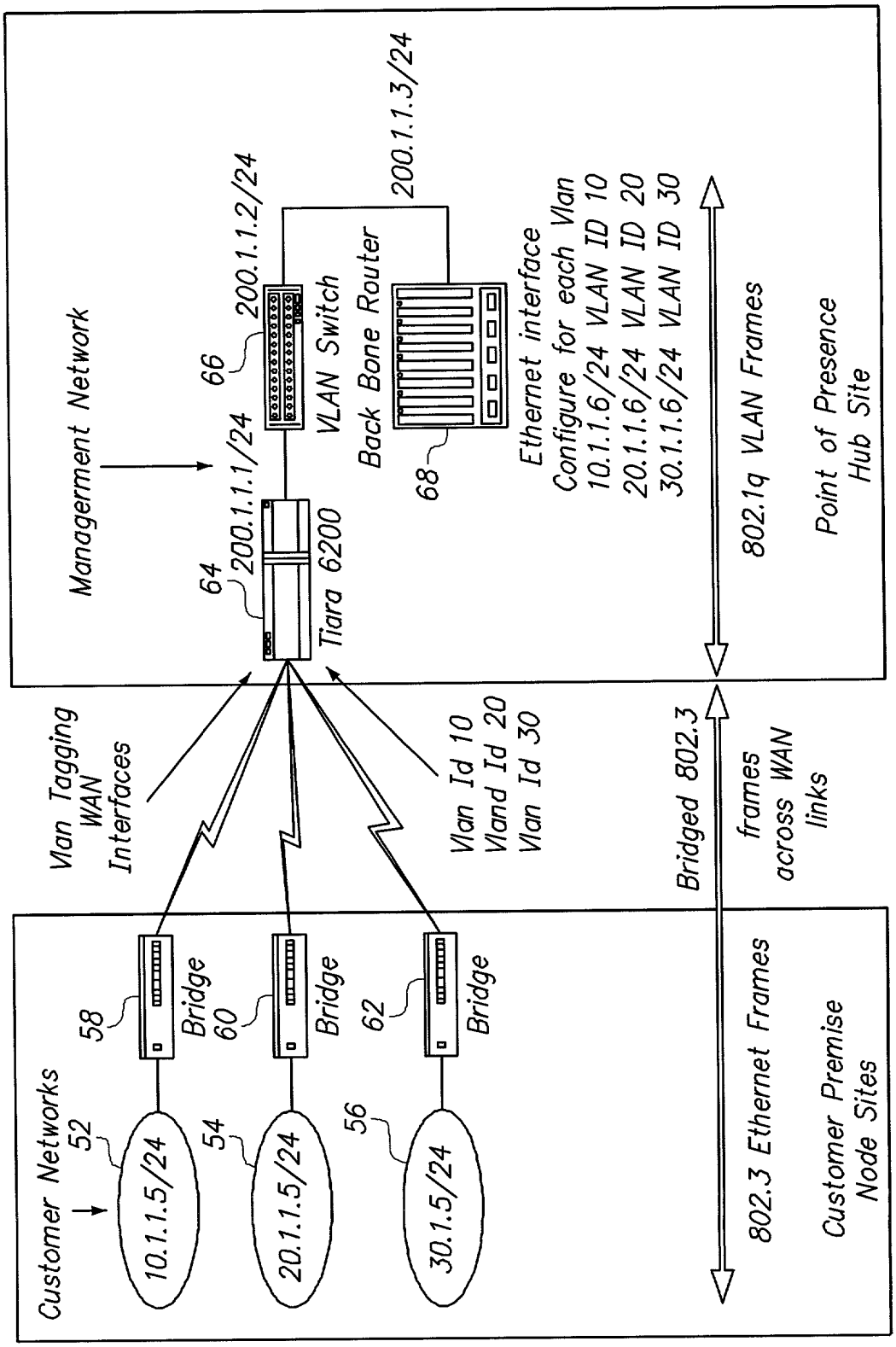
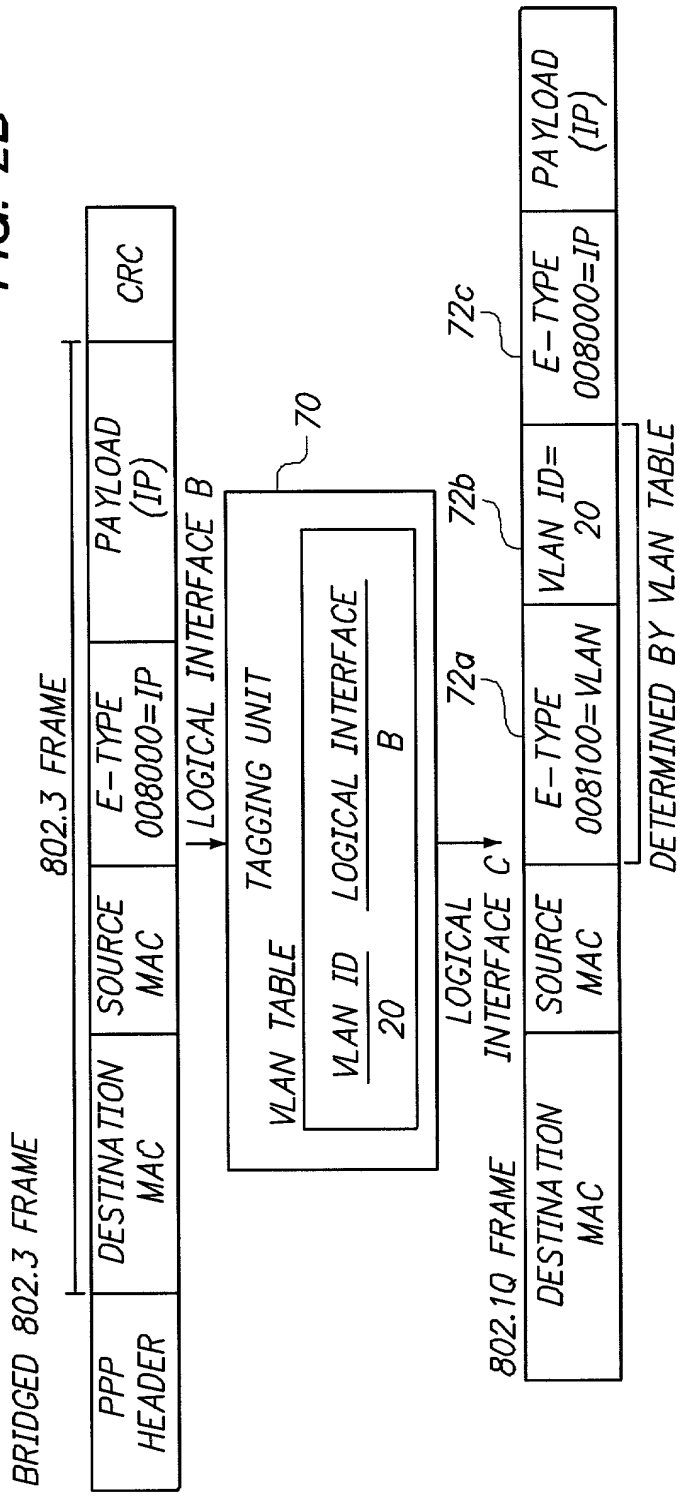

Managerment Network
64
200.1.1.1/24
Tiara 6200
66
200.1.1.2/24
VLAN Switch
Back Bone Router
200.1.1.3/24
68
Ethernet interface
Configure for each Vlan
10.1.1.6/24 VLAN ID 10
20.1.1.6/24 VLAN ID 20
30.1.1.6/24 VLAN ID 30
802.1q VLAN Frames
Point of Presence
Hub Site
Vlan Tagging
WAN
Interfaces
Vlan Id 10
Vland Id 20
Vlan Id 30
Bridged 802.3
frames
across WAN
links
Customer Networks
52
10.1.1.5/24
54
20.1.1.5/24
56
30.1.5/24
58
Bridge
60
Bridge
62
Bridge
802.3 Ethernet Frames
Customer Premise
Node Sites

FIG. 2A

FIG. 2B


BRIDGED 802.3 FRAME
PPP HEADER
DESTINATION MAC
SOURCE MAC
802.3 FRAME
E-TYPE 008000=IP
PAYLOAD (IP)
CRC
LOGICAL INTERFACE B
70
VLAN TABLE
TAGGING UNIT
VLAN ID 20
LOGICAL INTERFACE B
72a
72b
72c
LOGICAL INTERFACE C
802.1Q FRAME
DESTINATION MAC
SOURCE MAC
E-TYPE 008100=VLAN
VLAN ID= 20
E-TYPE 008000=IP
PAYLOAD (IP)
DETERMINED BY VLAN TABLE

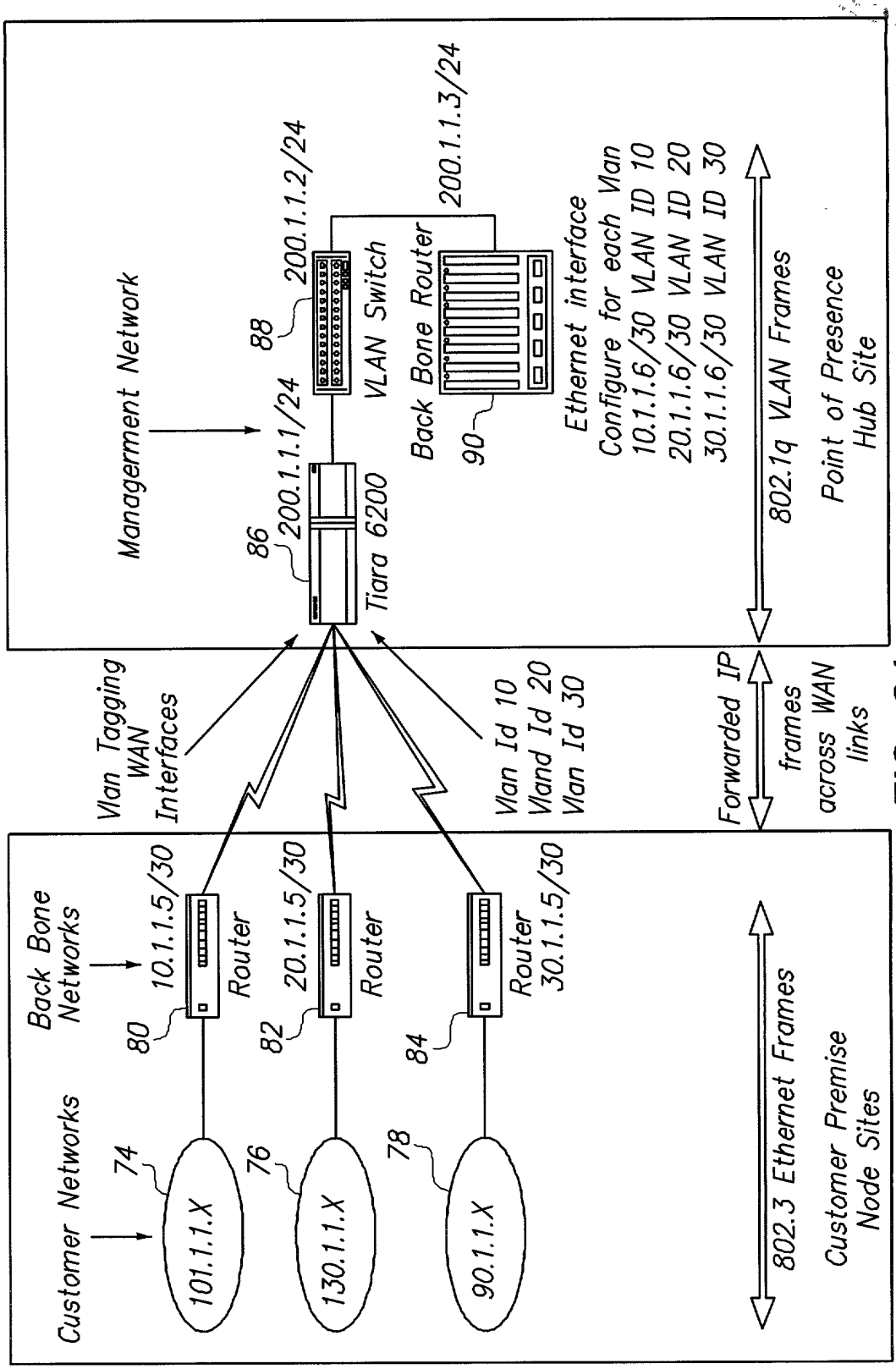
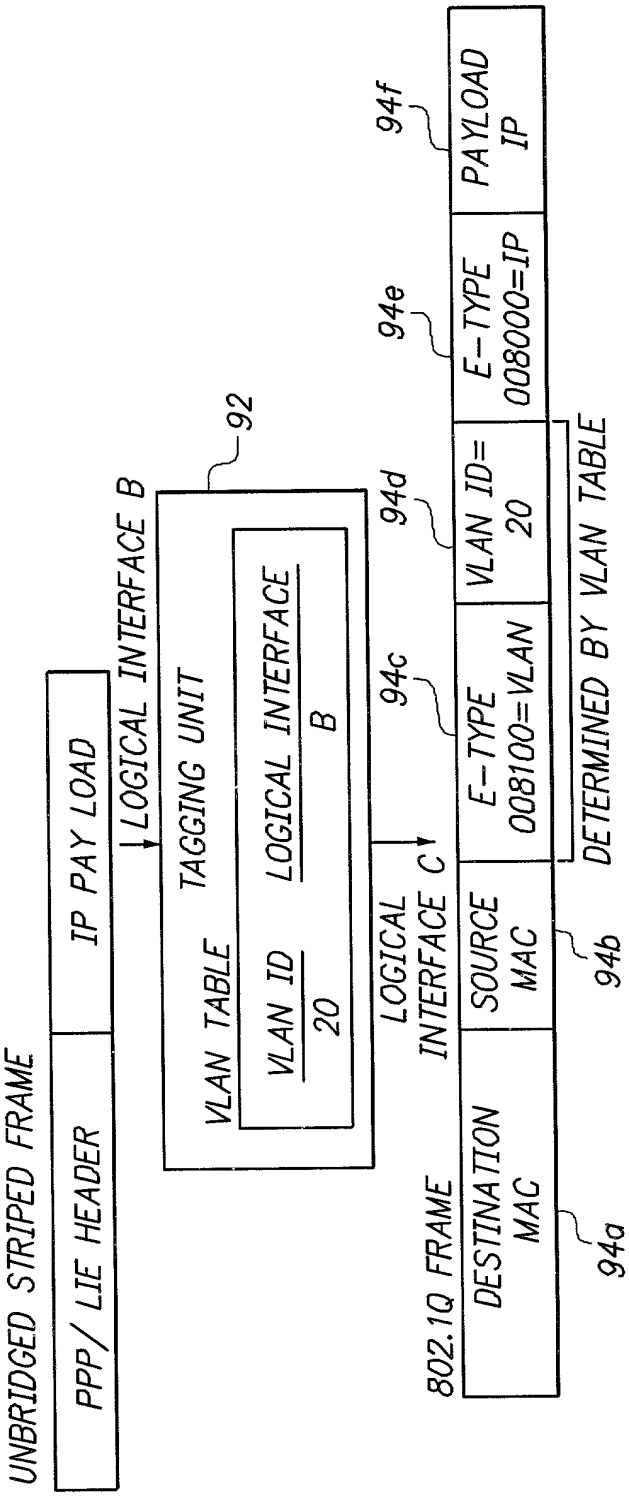


FIG. 3A

"DETECT" 4743660

FIG. 3B


UNBRIDGED STRIPED FRAME
PPP/ LIE HEADER
IP PAY LOAD
LOGICAL INTERFACE B
92
TAGGING UNIT
VLAN TABLE
VLAN ID
20
LOGICAL INTERFACE
B
802.1Q FRAME
DESTINATION MAC
SOURCE MAC
LOGICAL INTERFACE C
E-TYPE 008100=VLAN
VLAN ID= 20
E-TYPE 008000=IP
PAYLOAD IP
94a
94b
94c
94d
94e
94f
DETERMINED BY VLAN TABLE

TOE2TT*h2h8E660

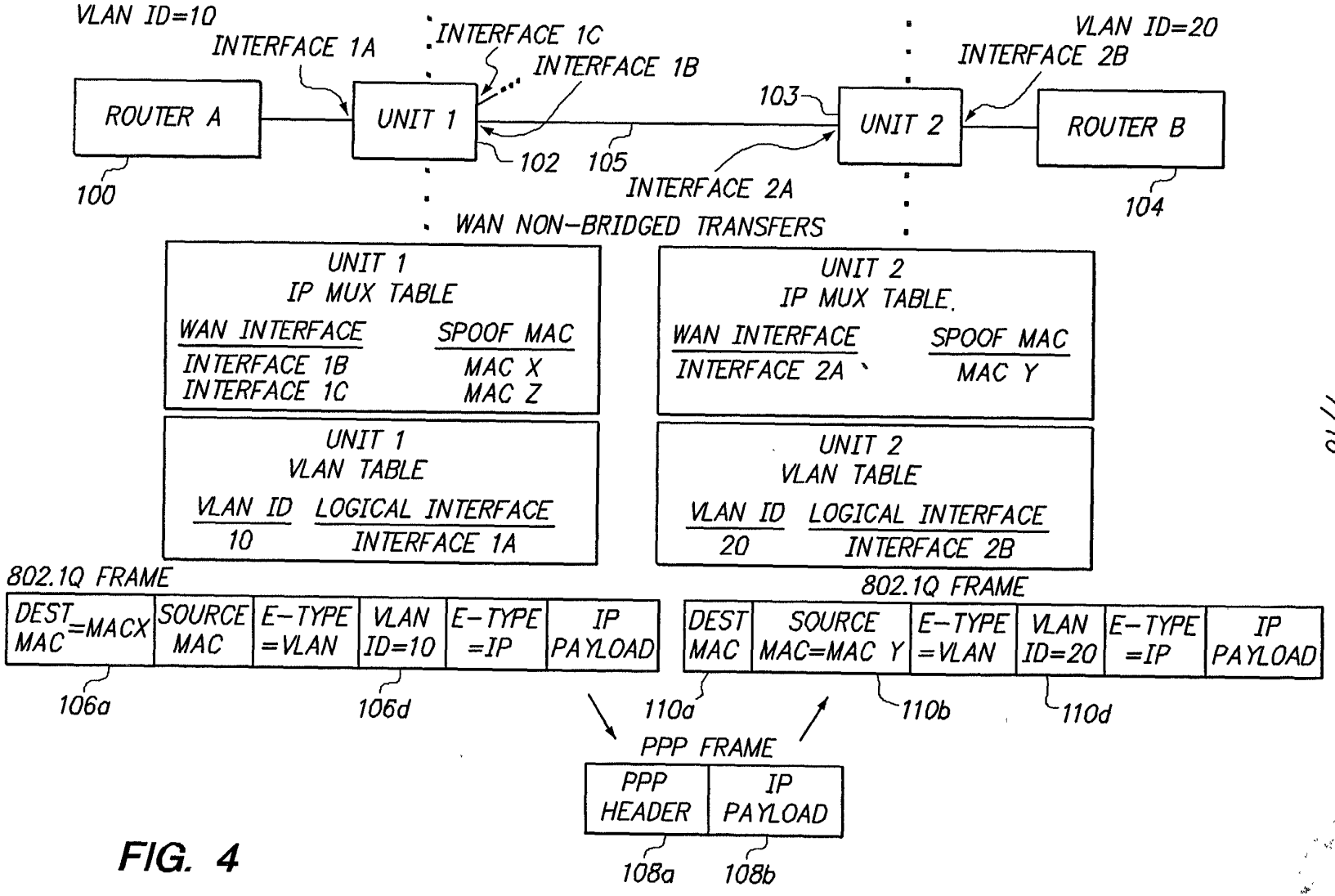


FIG. 4

APPLN. FILING DATE: AUGUST 23, 2001
TITLE: SYSTEM AND METHOD FOR CONNECTING GEO-GRAPHICALLY DISTRIBUTED VIRTUAL LOCAL AREA ...
INVENTOR: ANAND S. ATHREYA, ET AL.
APPLICATION SERIAL NO: 09/938,474

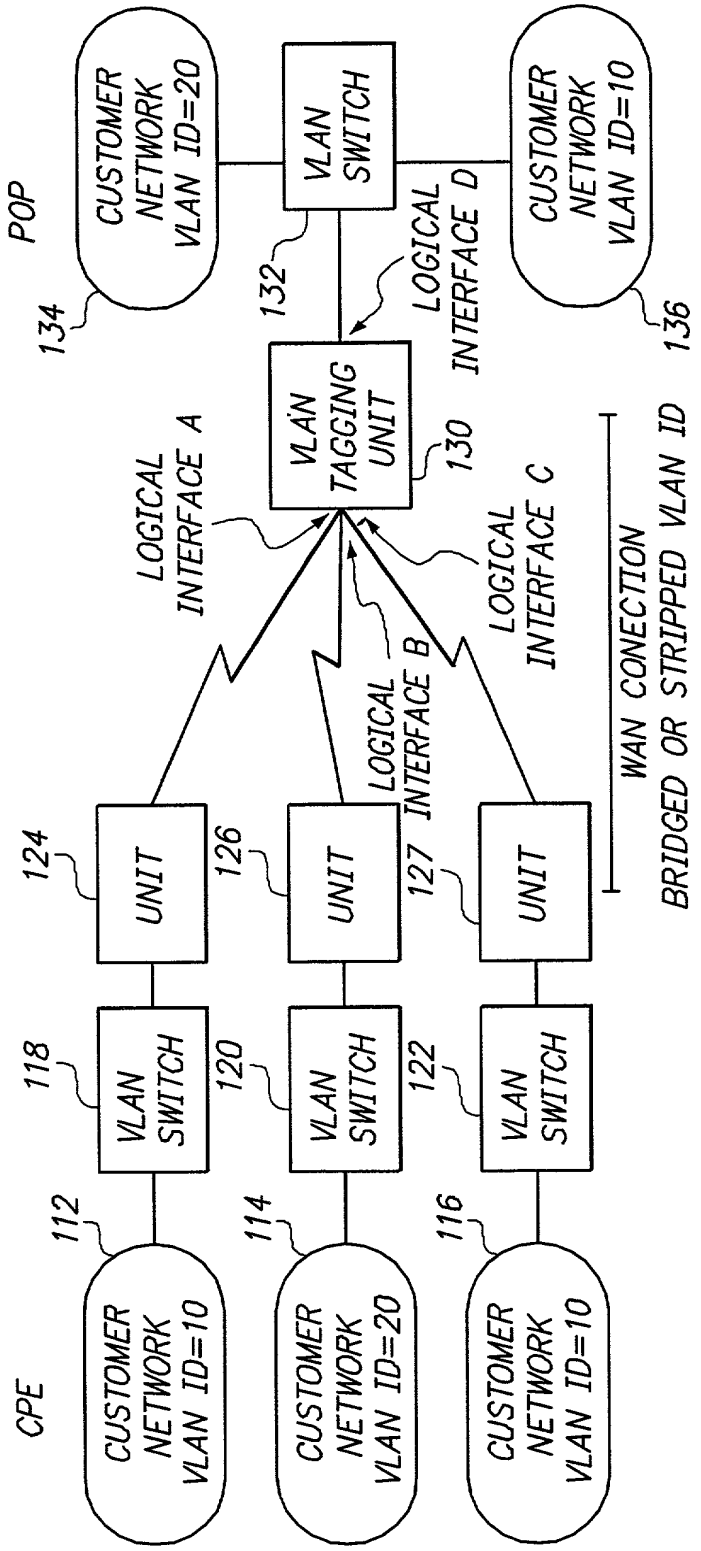

POP
CUSTOMER NETWORK VLAN ID=20
VLAN SWITCH
CUSTOMER NETWORK VLAN ID=10
134
132
LOGICAL INTERFACE D
136
VLAN TAGGING UNIT
130
LOGICAL INTERFACE A
LOGICAL INTERFACE B
LOGICAL INTERFACE C
WAN CONECTION
BRIDGED OR STRIPPED VLAN ID
124
126
127
UNIT
UNIT
UNIT
118
120
122
VLAN SWITCH
VLAN SWITCH
VLAN SWITCH
112
114
116
CPE
CUSTOMER NETWORK VLAN ID=10
CUSTOMER NETWORK VLAN ID=20
CUSTOMER NETWORK VLAN ID=10

FIG. 5

TOE2TT"h7182660

VLAN TABLE	ASSOCIATED LOGICAL INTERFACES	
VLAN ID	WAN	LAN
10	A, C	D
20	B	D

FIG. 6

VLAN TABLE	ASSOCIATED LOGICAL INTERFACES			
VLAN ID	WAN	LAN	FLOW INDICATION	QOS
30	E, F	G	IP SUBNET A	
40	E, F	G	IP SUBNET B	

FIG. 7

Appln. Filing Date: August 23, 2001
Title: System and Method for Connecting Geographically Distributed Virtual Local Area Networks
Inventor: Anand S. Athreya, et al.
Application Serial No: 09/938,474

DRAFT 4243660

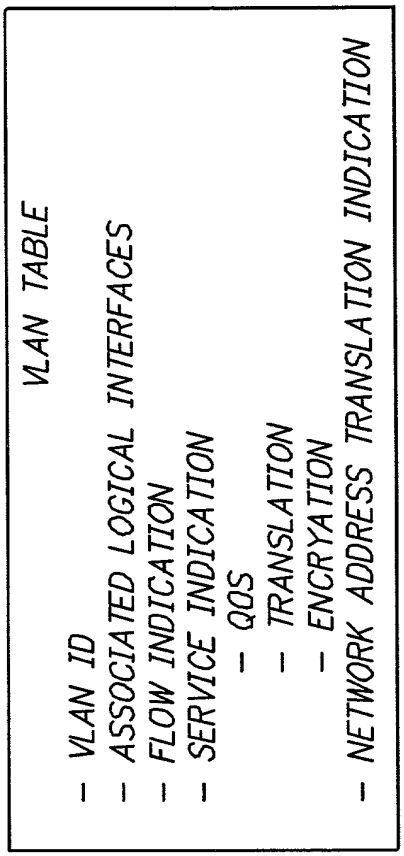


FIG. 8

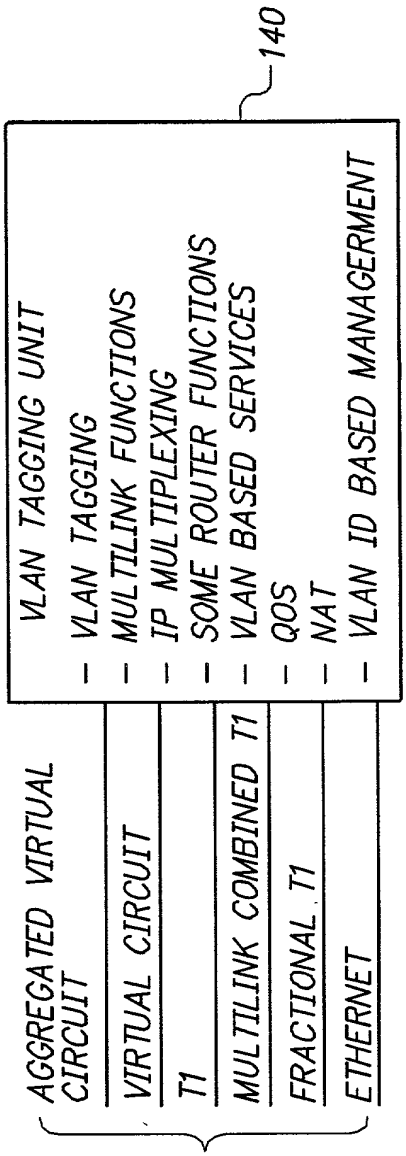


FIG. 9

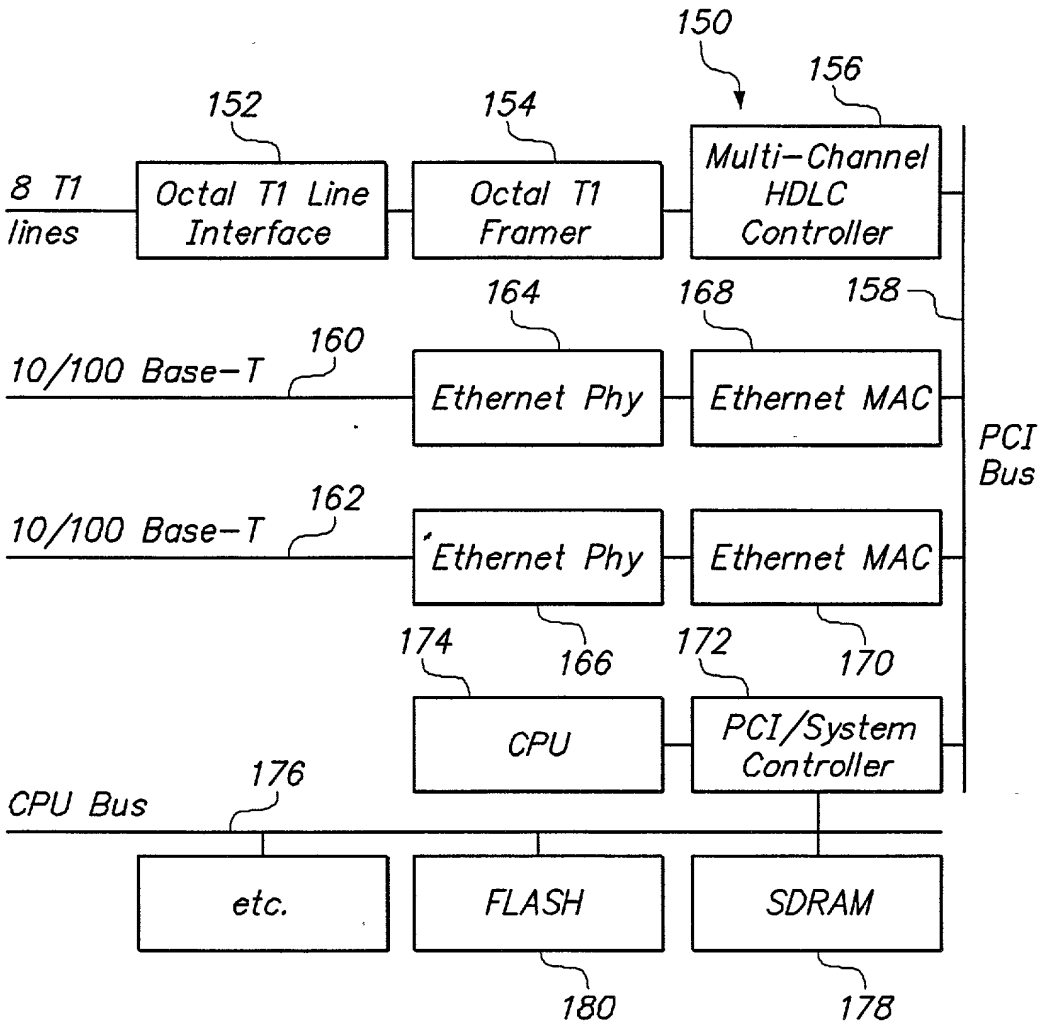

150
156
152
154
8 T1 lines
Octal T1 Line Interface
Octal T1 Framer
Multi-Channel HDLC Controller
164
168
158
160
10/100 Base-T
Ethernet Phy
Ethernet MAC
PCI Bus
162
10/100 Base-T
Ethernet Phy
Ethernet MAC
174
166
172
170
CPU
PCI/System Controller
176
CPU Bus
etc.
FLASH
SDRAM
180
178

FIG. 10

VLAN Forwarding Table Sample Output
Tiara/configure/vlanfwd>display vlanfwd table

Vlan Ether Type – 33024(0x8100)

Vlan Forwarding Table –

Interface Name	Vlan Id
ethernet0	100–120, 500, 4095
ethernet1	1–500, 600, 1000

VLAN Forwarding Statistics Sample Output
Tiara/configure/vlanfwd>display vlanfwd statistics

Vlan Forwarding Statistics –

Vlan Forwarding – ENABLED
Vlan Ether Type – 33024(0x8100)

Vlan Id: (4091)

Outgoing Vlan Packets: 500
Incoming Vlan Packets: 500
Dropped Vlan Packets: 0

Vlan Id: (4092)

Outgoing Vlan Packets: 2000
Incoming Vlan Packets: 2000
Dropped Vlan Packets: 0

Vlan Id: (4093)

Outgoing Vlan Packets: 10
Incoming Vlan Packets: 10
Dropped Vlan Packets: 0

FIG. 11

"DOCKET" 4748660

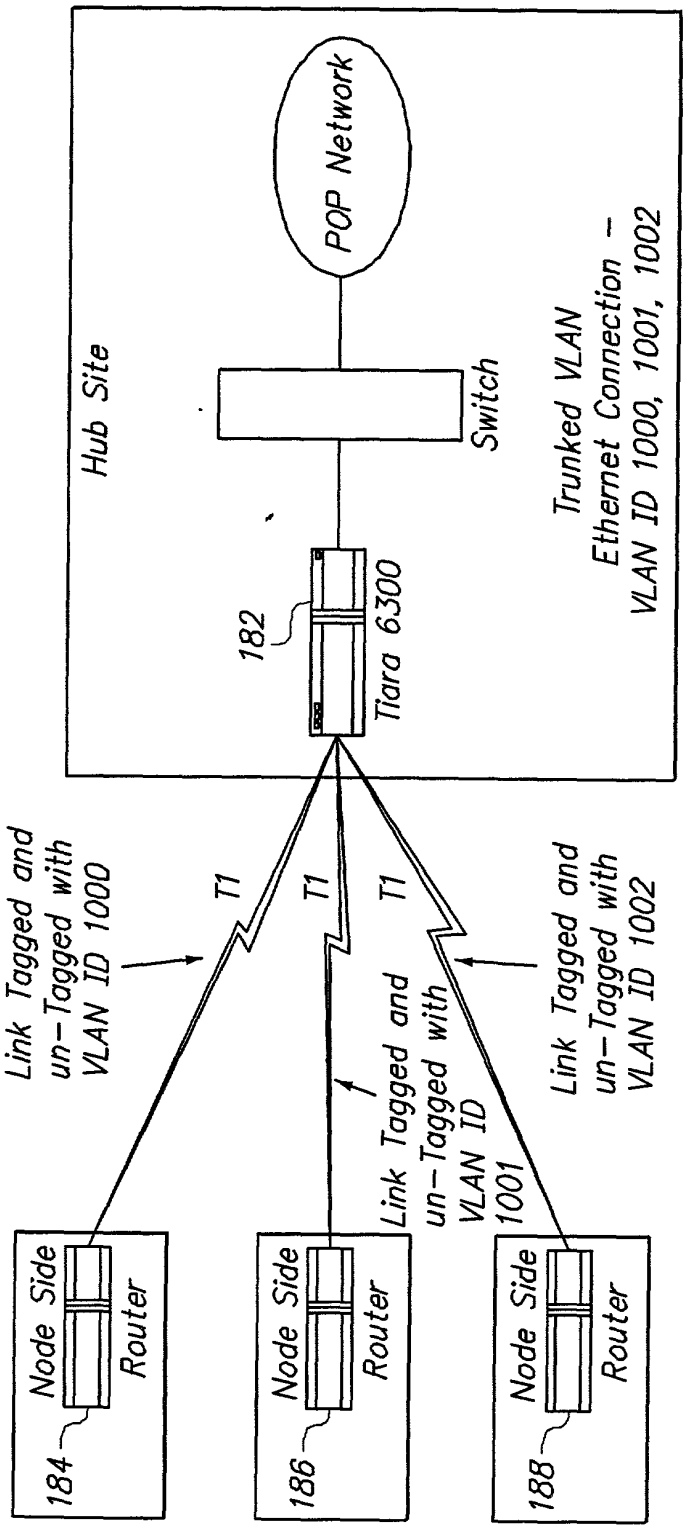


FIG. 12

Docket #4486.650

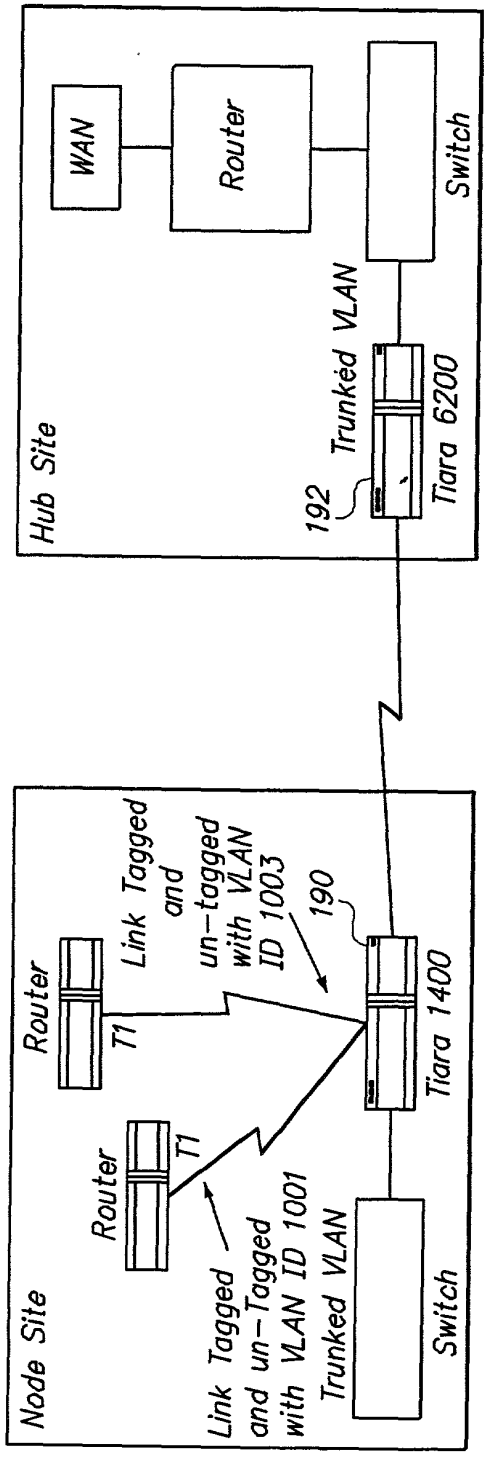

Hub Site
WAN
Router
Switch
Trunked VLAN
192
Tiara 6200
Node Site
Router
T1
Link Tagged and un-tagged with VLAN ID 1003
190
Tiara 1400
Router
T1
Link Tagged and un-Tagged with VLAN ID 1001
Trunked VLAN
Switch

FIG. 13

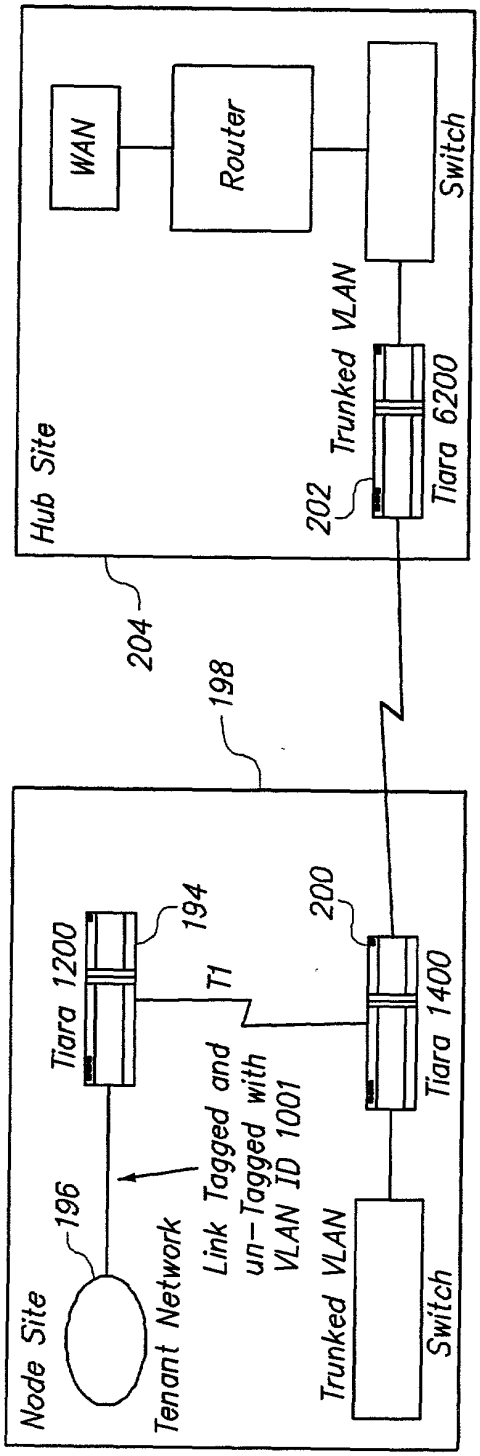

Hub Site
WAN
Router
Switch
Trunked VLAN
202
Tiara 6200
204
198
Node Site
Tiara 1200
194
T1
200
Tiara 1400
196
Tenant Network
Link Tagged and un-Tagged with VLAN ID 1001
Trunked VLAN
Switch

FIG. 14

"DRAFT" 4243650

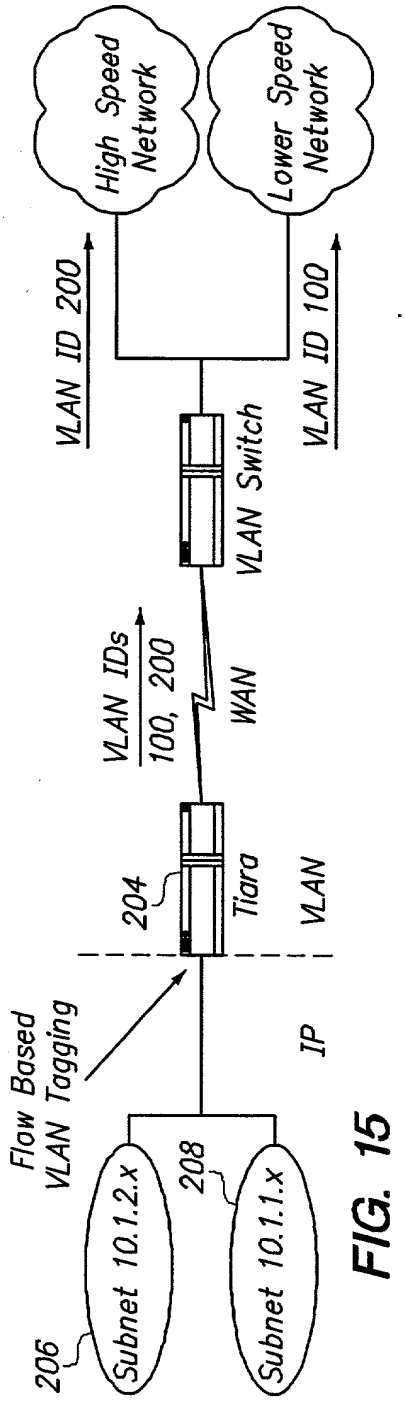


FIG. 15

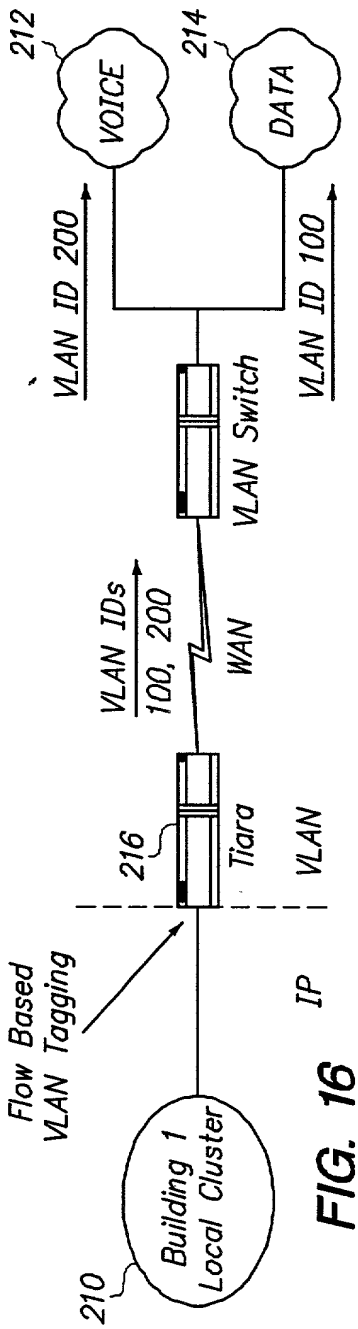


FIG. 16

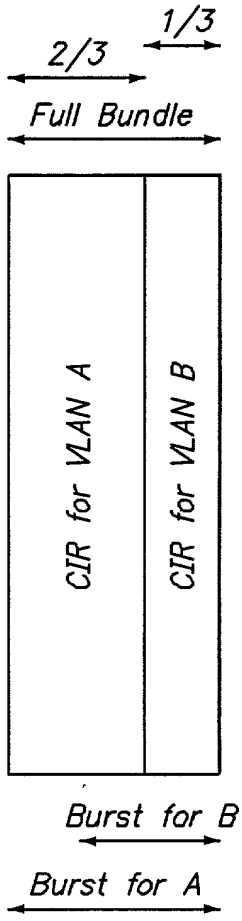


FIG. 18

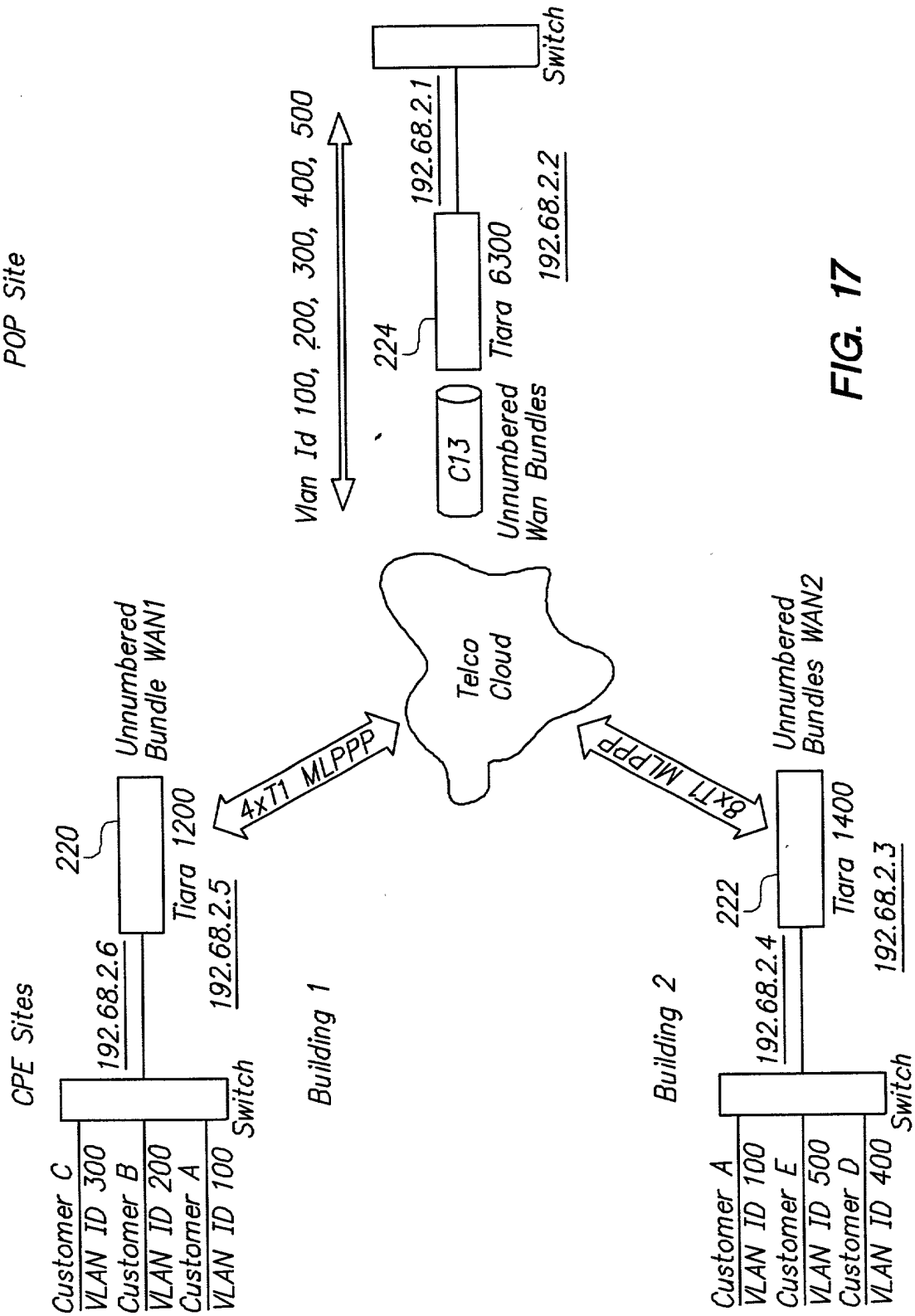

POP Site
Vlan Id 100, 200, 300, 400, 500
224
C13
Unnumbered Wan Bundles
Tiara 6300
192.68.2.2
192.68.2.1
Switch
Telco Cloud
4xT1 MLPPP
8xT1 MLPPP
Unnumbered Bundle WAN1
Unnumbered Bundles WAN2
220
222
Tiara 1200
Tiara 1400
192.68.2.5
192.68.2.3
192.68.2.6
192.68.2.4
Building 1
Building 2
CPE Sites
Customer C
VLAN ID 300
Customer B
VLAN ID 200
Customer A
VLAN ID 100
Switch
Customer A
VLAN ID 100
Customer E
VLAN ID 500
Customer D
VLAN ID 400
Switch

FIG. 17